

SEQUENCE LISTING

<110> University of North Carolina-Chapel Hill
Elkins, Christopher

<120> Isolated Polynucleotides Encoding DsrA, A Protein Conferring
Serum Resistance To *H. ducreyi*, And Methods And Compositions Comprising
The Same

<130> 5470-269.WO

<160> 18

<170> PatentIn version 3.1

<210> 1

<211> 1168

<212> DNA

<213> *Haemophilus ducreyi*

```

<400> 1
ataaatacgt cattgacatt tttttaatgt aaggtagaat aagaaagtaa attctatatt      60
tacaatcaag attgacaatt atttacttaa tgaggtgatt atgaaaatta aatgttttagt      120
tgccgtagtg ggattagctt gttctactat tacaacaatg gctcagcagc cgccaaagtt      180
tgctggagta tcttctttgt atagctatga gtatgactat ggtaagggta aatggacttg      240
gtctaataaa ggcgggttctg atattaaagt gccagggatt aaaatgaagc caaaagaatg      300
gattttctaaa caggtacttt atcttgaatt acagcattat atgccttata ctctgtttct      360
cgtgacatat gctcctggcg tttctctag ccttatactg ttatatccga tgtctgatcc      420
tgatcaactt ggaataaata ggcagcagct gaaattgaat ttgtatagtt attttaacga      480
tttaagacac gatttttaaa taaaagttct tgatgcacgt atttccaaaa ataaacaaaa      540
tattgatact ataagtaaat atttactaga actgggtact tatttagatg attcttatcg      600
tatgatggaa caaaatacac ataatatcaa taagttgtct aaagaattgc aaactggttt      660
agccaaccaa tcagcattgt ctatgttagt gcaaccaaat ggtgtaggca aaacgagcgt      720
ttctgctgcg gtaggaggtt atagagataa aactgcatta gccattgggtg tcggctcagc      780
cattactgat cgctttaccg ctaaagcggg tgtagcgttc aatacctaca atggcggcat      840
gtcttatggg gcttctgttg gttatgaatt ctaatcatta cgtttaatca ctaatcgttt      900
tggttataat aaaaaggcta aatgtttctc ctcacattta gcctttctta tttatctttg      960
ttatagcttt tgctgttata aaaccgtttt ttagccactt ttattaatta agcttttaag      1020
cctattcaat cagttctact ttcacttttt tcacatatt atccgccact tctaaaacgg      1080
taatattaag ttggtttagc ctaaattggg taccttctat cggaattttt tctaaatggt      1140
ctaaaattaa gccgttaaag gtgaggac      1168

```

<210> 2
 <211> 257
 <212> PRT
 <213> Haemophilus ducreyi

<400> 2

Met Lys Ile Lys Cys Leu Val Ala Val Val Gly Leu Ala Cys Ser Thr
 1 5 10 15

Ile Thr Thr Met Ala Gln Gln Pro Pro Lys Phe Ala Gly Val Ser Ser
 20 25 30

Leu Tyr Ser Tyr Glu Tyr Asp Tyr Gly Lys Gly Lys Trp Thr Trp Ser
 35 40 45

Asn Glu Gly Gly Phe Asp Ile Lys Val Pro Gly Ile Lys Met Lys Pro
 50 55 60

Lys Glu Trp Ile Ser Lys Gln Ala Thr Tyr Leu Glu Leu Gln His Tyr
 65 70 75 80

Met Pro Tyr Thr Pro Val Leu Val Thr Tyr Ala Pro Gly Val Ser Pro
 85 90 95

Ser Pro Ile Leu Leu Tyr Pro Met Ser Asp Pro Asp Gln Leu Gly Ile
 100 105 110

Asn Arg Gln Gln Leu Lys Leu Asn Leu Tyr Ser Tyr Phe Asn Asp Leu
 115 120 125

Arg His Asp Phe Lys Leu Lys Val Leu Asp Ala Arg Ile Ser Lys Asn
 130 135 140

Lys Gln Asn Ile Asp Thr Ile Ser Lys Tyr Leu Leu Glu Leu Gly Thr
 145 150 155 160

Tyr Leu Asp Asp Ser Tyr Arg Met Met Glu Gln Asn Thr His Asn Ile
 165 170 175

Asn Lys Leu Ser Lys Glu Leu Gln Thr Gly Leu Ala Asn Gln Ser Ala
 180 185 190

Leu Ser Met Leu Val Gln Pro Asn Gly Val Gly Lys Thr Ser Val Ser
 195 200 205

Ala Ala Val Gly Gly Tyr Arg Asp Lys Thr Ala Leu Ala Ile Gly Val

210

215

220

Gly Ser Arg Ile Thr Asp Arg Phe Thr Ala Lys Ala Gly Val Ala Phe
 225 230 235 240

Asn Thr Tyr Asn Gly Gly Met Ser Tyr Gly Ala Ser Val Gly Tyr Glu
 245 250 255

Phe

<210> 3
 <211> 1205
 <212> DNA
 <213> Haemophilus ducreyi

<400> 3
 attttataat ttacaataca ttttatatatt ttatattata taaatacgtc attgacattt 60
 ttttaaggta gaataagaaa gtaaattcta tatttacaat caagattgac aattatttac 120
 ttaatgaggt gattatgaaa attaaatggt tagttgccgt agtgggatta gcttggtcta 180
 ctattacaac aatggctcag cagccgccaa agtttgctgg agtatcttct ttgtatagct 240
 atgagtatga ctatggtaag ggtaaatgga cttgggtctaa tgaaggcggg ttcgatatta 300
 aagtgccagg gattaaaatg aagccaaaag aatggatttc taaacaggct acttatcttg 360
 aattacagca ttatatgect tatactcctg ttctcgtgac atatgctcat gacgttcctc 420
 ctagctctat actgttatat ccgatgtctg atcctgatca acttggaata aatcggcagc 480
 agctgaaatt gaatttgat agttatttta acgatttaag acacgatttt aaattaaaag 540
 ttcttgatgc acgtatttcc aaaaataaac aaaatattga tactataagt aaatatttac 600
 tagaactggg tacttattta gatgattctt atcgtatgat ggaacaaaat acacataata 660
 tcaataaaaa tacacataat atcaataagt tgtctaaaga attgcaaact ggtttagcca 720
 accaatcagc attgtctatg ttagtgcaac caaatggtgt aggcaaaaag agcgtttctg 780
 ctgcggtagg aggttataga gataaaactg cattagccat tgggtgctgc tcacgcatta 840
 ctgatecgtt taccgctaaa gcgggtgtag cgttcaatac ctacaatggc ggcatgtctt 900
 atggtgcttc tgttggttat gaattctaatt cattacgttt aatcactaat cgttttggtt 960
 ataataaaaa ggctaaatgt ttctcctcac atttagcctt tcttatttat ctttggtata 1020
 gcttttgctg ttataaaacc gtttttttagc cacttttatt aattaagctt ttaagcctat 1080
 tcaatcagtt ctactttcac ttttttcacc atattatccg ccacttctaa aacggtaata 1140
 ttaagttggt ttagcctaaa ttgggtacct tctatcggaa ttttttctaa atgttctaaa 1200

attaa

1205

<210> 4
<211> 264
<212> PRT
<213> Haemophilus ducreyi

<400> 4

Met Lys Ile Lys Cys Leu Val Ala Val Val Gly Leu Ala Cys Ser Thr
1 5 10 15

Ile Thr Thr Met Ala Gln Gln Pro Pro Lys Phe Ala Gly Val Ser Ser
20 25 30

Leu Tyr Ser Tyr Glu Tyr Asp Tyr Gly Lys Gly Lys Trp Thr Trp Ser
35 40 45

Asn Glu Gly Gly Phe Asp Ile Lys Val Pro Gly Ile Lys Met Lys Pro
50 55 60

Lys Glu Trp Ile Ser Lys Gln Ala Thr Tyr Leu Glu Leu Gln His Tyr
65 70 75 80

Met Pro Tyr Thr Pro Val Leu Val Thr Tyr Ala His Asp Val Pro Pro
85 90 95

Ser Ser Ile Leu Leu Tyr Pro Met Ser Asp Pro Asp Gln Leu Gly Ile
100 105 110

Asn Arg Gln Gln Leu Lys Leu Asn Leu Tyr Ser Tyr Phe Asn Asp Leu
115 120 125

Arg His Asp Phe Lys Leu Lys Val Leu Asp Ala Arg Ile Ser Lys Asn
130 135 140

Lys Gln Asn Ile Asp Thr Ile Ser Lys Tyr Leu Leu Glu Leu Gly Thr
145 150 155 160

Tyr Leu Asp Asp Ser Tyr Arg Met Met Glu Gln Asn Thr His Asn Ile
165 170 175

Asn Lys Asn Thr His Asn Ile Asn Lys Leu Ser Lys Glu Leu Gln Thr
180 185 190

Gly Leu Ala Asn Gln Ser Ala Leu Ser Met Leu Val Gln Pro Asn Gly
195 200 205

Val Gly Lys Thr Ser Val Ser Ala Ala Val Gly Gly Tyr Arg Asp Lys
 210 215 220

Thr Ala Leu Ala Ile Gly Val Gly Ser Arg Ile Thr Asp Arg Phe Thr
 225 230 235 240

Ala Lys Ala Gly Val Ala Phe Asn Thr Tyr Asn Gly Gly Met Ser Tyr
 245 250 255

Gly Ala Ser Val Gly Tyr Glu Phe
 260

<210> 5
 <211> 952
 <212> DNA
 <213> Haemophilus ducreyi

<400> 5
 attttataat ttacaataca ttttatatatt ttatattata taaatacgtc attgacattt 60
 ttttaaggta gaataagaaa gtaaattcta tatttacaat caagattgac aattatttac 120
 ttaatgaggt gattatgaaa attaaatggt tagttgccgt agtgggatta gcttgttcta 180
 ctattacaac aatggctcag cagccgccaa agtttgctgg agtatcttct ttgtatagct 240
 atgagtatga ctatggtaag ggtaaattgga cttgggtctaa tgaaggcggg ttcgatatta 300
 aagtgccagg gattaaaatg aagccaaaag aatggatttc taaacaggct acttatcttg 360
 aattacagca ttatatgcct tatactcctg ttctcgtgac atatgctcat gacgttcctc 420
 ctagctctat actgttatat ccgatgtctg atcctgatca acttggaata aatcggcagc 480
 agctgaaatt gaatttgtat agttatttta acgatttaag acacgatttt aaattaaaag 540
 ttcttgatgc acgtatttcc aaaaataaac aaaatattga tactataagt aaatatttac 600
 tagaactggg tacttattta gatgattctt atcgtatgat ggaacaaaat acacataata 660
 tcaataaaaa tacacataat atcaataagt tgtctaaaga attgcaaact ggtttagcca 720
 accaatcagc attgtctatg ttagtgcaac caaatgggtg aggcaaaacg agcgtttctg 780
 ctgcggtagg aggttataga gataaaactg cattagccat tgggtgctggc tcacgcatta 840
 ctgatcgctt taccgctaaa gcgggtgtag cgttcaatac ctacaatggc ggcatgtctt 900
 atgggtgcttc tgttgggtat gaattctaatt cattacgttt aatcactaat cg 952

<210> 6
 <211> 264
 <212> PRT
 <213> Haemophilus ducreyi

<400> 6

Met Lys Ile Lys Cys Leu Val Ala Val Val Gly Leu Ala Cys Ser Thr
1 5 10 15

Ile Thr Thr Met Ala Gln Gln Pro Pro Lys Phe Ala Gly Val Ser Ser
20 25 30

Leu Tyr Ser Tyr Glu Tyr Asp Tyr Gly Lys Gly Lys Trp Thr Trp Ser
35 40 45

Asn Glu Gly Gly Phe Asp Ile Lys Val Pro Gly Ile Lys Met Lys Pro
50 55 60

Lys Glu Trp Ile Ser Lys Gln Ala Thr Tyr Leu Glu Leu Gln His Tyr
65 70 75 80

Met Pro Tyr Thr Pro Val Leu Val Thr Tyr Ala His Asp Val Pro Pro
85 90 95

Ser Ser Ile Leu Leu Tyr Pro Met Ser Asp Pro Asp Gln Leu Gly Ile
100 105 110

Asn Arg Gln Gln Leu Lys Leu Asn Leu Tyr Ser Tyr Phe Asn Asp Leu
115 120 125

Arg His Asp Phe Lys Leu Lys Val Leu Asp Ala Arg Ile Ser Lys Asn
130 135 140

Lys Gln Asn Ile Asp Thr Ile Ser Lys Tyr Leu Leu Glu Leu Gly Thr
145 150 155 160

Tyr Leu Asp Asp Ser Tyr Arg Met Met Glu Gln Asn Thr His Asn Ile
165 170 175

Asn Lys Asn Thr His Asn Ile Asn Lys Leu Ser Lys Glu Leu Gln Thr
180 185 190

Gly Leu Ala Asn Gln Ser Ala Leu Ser Met Leu Val Gln Pro Asn Gly
195 200 205

Val Gly Lys Thr Ser Val Ser Ala Ala Val Gly Gly Tyr Arg Asp Lys
210 215 220

Thr Ala Leu Ala Ile Gly Val Gly Ser Arg Ile Thr Asp Arg Phe Thr
225 230 235 240

Ala Lys Ala Gly Val Ala Phe Asn Thr Tyr Asn Gly Gly Met Ser Tyr
 245 250 255

Gly Ala Ser Val Gly Tyr Glu Phe
 260

<210> 7
 <211> 899
 <212> DNA
 <213> Haemophilus ducreyi

<400> 7
 ttttataatt tacaatacat tttatatattt tatattatat aaatacgtca ttgacatttt 60
 tttaatgtaa ggtagaataa gaaagtaa tctatatatta caatcaagat tgacaattat 120
 ttacttaatg aggtgattat gaaaattaaa tgttttagttg ccgtagtggg attagcttgt 180
 tctactatta caacaatggc tcagcagccg ccaagtttg ctggagtatc ttctttgtat 240
 agctatgagt atgactatgg taagggtaaa tggacttggc ctaatgaagg cggtttcgat 300
 attaaagtgc cagggattaa aatgaagcca aaagaatgga tttctaaaca ggctaactat 360
 cttgaattac agcattatat gccttatact cctgttctcg tgacatatgc tctggcggtt 420
 tctcctagcc ctatactggt atatccgatg tctgatcctg atcaacttgg aataaatcgg 480
 cagcagctga aattgaattt gtatagttat tttaacgatt taagacacga ttttaaatta 540
 aaagttcttg atgcacgtat ttccaaaaat aaacaaaata ttgatactat aagtaaatat 600
 ttactagaac tgggtactta tttagatgat tottatcgta tgatggaaca aaatacacat 660
 aatatcaata agttgtctaa agaattgcaa actgggttag ccaaccaatc agcattgtct 720
 atgttagtgc aaccaaattg tgtaggcaaa acgagcggtt ctgctgcggt aggaggttat 780
 agagataaaa ctgcattagc cattggtgtc ggctcacgca ttactgatcg ctttaccgct 840
 aaagcgggtg tagcgttcaa taccttctat cggaattttt tctaaatggt ctaaaatta 899

<210> 8
 <211> 242
 <212> PRT
 <213> Haemophilus ducreyi

<400> 8

Met Lys Ile Lys Cys Leu Val Ala Val Val Gly Leu Ala Cys Ser Thr
 1 5 10 15

Ile Thr Thr Met Ala Gln Gln Pro Pro Lys Phe Ala Gly Val Ser Ser
 20 25 30

Leu Tyr Ser Tyr Glu Tyr Asp Tyr Gly Lys Gly Lys Trp Thr Trp Ser
 35 40 45

Asn Glu Gly Gly Phe Asp Ile Lys Val Pro Gly Ile Lys Met Lys Pro
 50 55 60

Lys Glu Trp Ile Ser Lys Gln Ala Thr Tyr Leu Glu Leu Gln His Tyr
 65 70 75 80

Met Pro Tyr Thr Pro Val Leu Val Thr Tyr Ala Pro Gly Val Ser Pro
 85 90 95

Ser Pro Ile Leu Leu Tyr Pro Met Ser Asp Pro Asp Gln Leu Gly Ile
 100 105 110

Asn Arg Gln Gln Leu Lys Leu Asn Leu Tyr Ser Tyr Phe Asn Asp Leu
 115 120 125

Arg His Asp Phe Lys Leu Lys Val Leu Asp Ala Arg Ile Ser Lys Asn
 130 135 140

Lys Gln Asn Ile Asp Thr Ile Ser Lys Tyr Leu Leu Glu Leu Gly Thr
 145 150 155 160

Tyr Leu Asp Asp Ser Tyr Arg Met Met Glu Gln Asn Thr His Asn Ile
 165 170 175

Asn Lys Leu Ser Lys Glu Leu Gln Thr Gly Leu Ala Asn Gln Ser Ala
 180 185 190

Leu Ser Met Leu Val Gln Pro Asn Gly Val Gly Lys Thr Ser Val Ser
 195 200 205

Ala Ala Val Gly Gly Tyr Arg Asp Lys Thr Ala Leu Ala Ile Gly Val
 210 215 220

Gly Ser Arg Ile Thr Asp Arg Phe Thr Ala Lys Ala Gly Val Ala Phe
 225 230 235 240

Asn Thr

<210> 9
 <211> 1197
 <212> DNA
 <213> Haemophilus ducreyi

<400> 9
 aatggccatt ttataattta caatacattt tatattttta tattatataa atacgtcatt 60
 gacatttttt taatgtaagg tagaataaga aagtaaattc tatatttaca atcaagattg 120
 acaattattt acttaatgag gtgattatga aaattaaatg tttagttgcc gtagtgggat 180
 tagcttggtc tactattaca acaatggctc agcagccgcc aaagtttgct ggagtatctt 240
 ctttgatatag ctatgagtat gactatggta agggtaaattg gacttggtct aatgaaggcg 300
 gtttcgatat taaagtgcc gggattaaaa tgaagccaaa agaattggatt tctaaacagg 360
 ctacttatct tgaattacag cattatatgc cttatactcc tgttctcgtg acatatgctc 420
 ctggcggtttc tctagccct atactgttat atccgatgct tgatcctgat caacttggaa 480
 taaatcgga gcagctgaaa ttgaatttgt atagttattt taacgattta agacacgatt 540
 ttaaattaaa agttcttgat gcacgtattt ccaaaaataa acaaaatatt gatactataa 600
 gtaaatttt actagaactg ggtacttatt tagatgattc ttatcgtag atggaacaaa 660
 atacacataa tatcaataag ttgtctaaag aattgcaaac tggtttagcc aaccaatcag 720
 cattgtctat gttagtcaa ccaaatgggt taggcaaac gagcgtttct gctgcggtag 780
 gaggttatag agataaaact gcattagcca ttgggtgctgg ctacgcatt actgatcgct 840
 ttaccgctaa agcgggtgta gcgttcaata cctacaatgg cggcatgtct tatggtgctt 900
 ctgttggtta tgaattctaa tcattacgtt taatcactaa tcgttttggt tataataaaa 960
 aggctaaatg tttctcctca catttagcct ttcttattta tctttggtat agccttttgc 1020
 tgttataaaa ccgtttttta gccactttta ttaattaagc ttttaagcct attcaatcag 1080
 ttctactttc acttttttca ccatattatc cgccacttct aaaacggtaa tattaagttg 1140
 gtttagccta aattgggtac cttctatcgg aattttttct aaatgttcta aaattaa 1197

<210> 10
 <211> 257
 <212> PRT
 <213> Haemophilus ducreyi

<400> 10

Met Lys Ile Lys Cys Leu Val Ala Val Val Gly Leu Ala Cys Ser Thr
 1 5 10 15

Ile Thr Thr Met Ala Gln Gln Pro Pro Lys Phe Ala Gly Val Ser Ser
 20 25 30

Leu Tyr Ser Tyr Glu Tyr Asp Tyr Gly Lys Gly Lys Trp Thr Trp Ser
 35 40 45

Asn Glu Gly Gly Phe Asp Ile Lys Val Pro Gly Ile Lys Met Lys Pro
 50 55 60

Lys Glu Trp Ile Ser Lys Gln Ala Thr Tyr Leu Glu Leu Gln His Tyr
 65 70 75 80

Met Pro Tyr Thr Pro Val Leu Val Thr Tyr Ala Pro Gly Val Ser Pro
 85 90 95

Ser Pro Ile Leu Leu Tyr Pro Met Ser Asp Pro Asp Gln Leu Gly Ile
 100 105 110

Asn Arg Gln Gln Leu Lys Leu Asn Leu Tyr Ser Tyr Phe Asn Asp Leu
 115 120 125

Arg His Asp Phe Lys Leu Lys Val Leu Asp Ala Arg Ile Ser Lys Asn
 130 135 140

Lys Gln Asn Ile Asp Thr Ile Ser Lys Tyr Leu Leu Glu Leu Gly Thr
 145 150 155 160

Tyr Leu Asp Asp Ser Tyr Arg Met Met Glu Gln Asn Thr His Asn Ile
 165 170 175

Asn Lys Leu Ser Lys Glu Leu Gln Thr Gly Leu Ala Asn Gln Ser Ala
 180 185 190

Leu Ser Met Leu Val Gln Pro Asn Gly Val Gly Lys Thr Ser Val Ser
 195 200 205

Ala Ala Val Gly Gly Tyr Arg Asp Lys Thr Ala Leu Ala Ile Gly Val
 210 215 220

Gly Ser Arg Ile Thr Asp Arg Phe Thr Ala Lys Ala Gly Val Ala Phe
 225 230 235 240

Asn Thr Tyr Asn Gly Gly Met Ser Tyr Gly Ala Ser Val Gly Tyr Glu
 245 250 255

Phe

<210> 11
 <211> 923
 <212> DNA
 <213> Haemophilus ducreyi

<400> 11
tattttacaat caagattgac aattatattac ttaatgaggt gattatgaaa attaaatggt 60
tagttgccgt agtgggatta gcttggttcta ctattacaac aatggctcag cagccgccaa 120
agtttgctgg agtatcttct ttggatagct atgagtatga ctatggtaag ggtaaattga 180
cttggtctga aaaagacggg ttcgatatta aagcgccagg gattaaaatg aagccaaaaa 240
aatggatttc tagacaggct acttatcttg gattacagca ttatatgcct tatactcctg 300
ttctcgtgac atatgcttct gcagaacctt acactgtact gttatatccg atgcctgac 360
ctgatcaact tggaataaat cggcagcagc tgaaattgaa tttgtatagt tattttaacg 420
atttaagaca cggtttttaa ttaaattgtt ttgatgcacg tatttcccaa aataaacaaa 480
atattgatac tataagtga tatttactaa aactgggtac ttatttagat agttcttctc 540
gtatgatgga acaaaatata cataatatca ataaaaatc acataatatc aataagttgt 600
ctaaagaatt gcaaactggg ttagccaacc aatcagcatt gtctatgtta gtgcaaccaa 660
atgggtgtagg caaaacgagc gtttctgctg cggtaggagg ttatagagat aaaactgcat 720
tagccattgg tgtcggctca cgcattactg atcgctttac cgctaaagcg ggtgtagcgt 780
tcaataccta caatggcggc atgtcttatg gtgcttctgt tggttatgaa ttctaactcat 840
tacgtttaat cactaatcgt tttgggtata ataaaaaggc taaatgtttc tcttcacatt 900
tagcctttct tatttatctt tgt 923

<210> 12
<211> 263
<212> PRT
<213> Haemophilus ducreyi

<400> 12

Met Lys Ile Lys Cys Leu Val Ala Val Val Gly Leu Ala Cys Ser Thr
1 5 10 15

Ile Thr Thr Met Ala Gln Gln Pro Pro Lys Phe Ala Gly Val Ser Ser
20 25 30

Leu Asp Ser Tyr Glu Tyr Asp Tyr Gly Lys Gly Lys Trp Thr Trp Ser
35 40 45

Glu Lys Asp Gly Phe Asp Ile Lys Ala Pro Gly Ile Lys Met Lys Pro
50 55 60

Lys Lys Trp Ile Ser Arg Gln Ala Thr Tyr Leu Gly Leu Gln His Tyr
65 70 75 80

Met Pro Tyr Thr Pro Val Leu Val Thr Tyr Ala Ser Ala Glu Pro Asn
85 90 95

Thr Val Leu Leu Tyr Pro Met Pro Asp Pro Asp Gln Leu Gly Ile Asn
100 105 110

Arg Gln Gln Leu Lys Leu Asn Leu Tyr Ser Tyr Phe Asn Asp Leu Arg
115 120 125

His Gly Phe Lys Leu Asn Val Leu Asp Ala Arg Ile Ser Gln Asn Lys
130 135 140

Gln Asn Ile Asp Thr Ile Ser Glu Tyr Leu Leu Lys Leu Gly Thr Tyr
145 150 155 160

Leu Asp Ser Ser Tyr Arg Met Met Glu Gln Asn Thr His Asn Ile Asn
165 170 175

Lys Asn Thr His Asn Ile Asn Lys Leu Ser Lys Glu Leu Gln Thr Gly
180 185 190

Leu Ala Asn Gln Ser Ala Leu Ser Met Leu Val Gln Pro Asn Gly Val
195 200 205

Gly Lys Thr Ser Val Ser Ala Ala Val Gly Gly Tyr Arg Asp Lys Thr
210 215 220

Ala Leu Ala Ile Gly Val Gly Ser Arg Ile Thr Asp Arg Phe Thr Ala
225 230 235 240

Lys Ala Gly Val Ala Phe Asn Thr Tyr Asn Gly Gly Met Ser Tyr Gly
245 250 255

Ala Ser Val Gly Tyr Glu Phe
260

<210> 13
<211> 1231
<212> DNA
<213> Haemophilus ducreyi

<400> 13
cttttataat ttacaataca ttttatattt ttatattata taaatacgtc attgacattt 60
ttttaatgta aggtagaata agaaagtaaa ttctatattt acaatcaaga ttgacaatta 120
tttacttaat gaggtgatta tgaaaattaa atgttttagtt gccgtagtgg gattagcttg 180
ttctactatt acaacaatgg ctcagcagcc gccaaagttt gctggagtat cttcttttga 240

tagctatgag tatgactatg gtaagggtaa atggacttgg tctaatagaag gcgggtttcga 300
 tattaagaatg ccagggatta aaatgaagcc aaaagaatgg atttctaaac aggctactta 360
 tcttgaatta cagcattata tgccttatac tctgtttctc gtgacalctg ctcttgacgt 420
 tctctctagc tctatactgt tatatccgat gtctgatcct gatcaacttg gaataaatcg 480
 gcagcagctg aaattgaatt tgtatagtta ttttaacgat ttaagacacg attttaaatt 540
 aaaagttctt gatgcacgta tttccaaaaa taaacaaaat attgatacta taagtaaata 600
 tttactagaa ctgggtactt atttagatgg ttcttatcgt atgatggaac aaaatacaca 660
 taatatcaat aaaaatacac ataatatcaa taaaaatata cataatatca ataagttgtc 720
 taaagaattg caaactgggt tagccaacca atcagcattg tctatgttag tgcaaccaa 780
 tgggtgtaggc aaaacgagcg tttctgctgc ggtaggaggt tatagagata aaactgcatt 840
 agccattgggt gtcggctcac gcattactga tgcctttacc gctaaagcgg gtgtagcgtt 900
 caatacctac aatggcggca tgtcttatgg tgcttctggt gggttatgaat tctaatacatt 960
 acgtttaatc actaatcgtt ttgggtataa taaaaaggct aaatgtttct cctcacattt 1020
 agcctttctt atttatcttt gttatagctt ttgctgttat aaaaccgttt tttagccact 1080
 tttattaatt aagcttttaa gcctattcaa tcagttctac tttcactttt ttcaccatat 1140
 tatccgccac ttctaaaacg gtaatattaa gttgggttag cctaaattgg gtaccttcta 1200
 tcggaatttt ttctaaatgt tctaaaatta a 1231

<210> 14
 <211> 271
 <212> PRT
 <213> Haemophilus ducreyi

<400> 14

Met Lys Ile Lys Cys Leu Val Ala Val Val Gly Leu Ala Cys Ser Thr
 1 5 10 15

Ile Thr Thr Met Ala Gln Gln Pro Pro Lys Phe Ala Gly Val Ser Ser
 20 25 30

Leu Tyr Ser Tyr Glu Tyr Asp Tyr Gly Lys Gly Lys Trp Thr Trp Ser
 35 40 45

Asn Glu Gly Gly Phe Asp Ile Lys Val Pro Gly Ile Lys Met Lys Pro
 50 55 60

Lys Glu Trp Ile Ser Lys Gln Ala Thr Tyr Leu Glu Leu Gln His Tyr
 65 70 75 80

Met Pro Tyr Thr Pro Val Leu Val Thr Ser Ala Pro Asp Val Pro Pro
85 90 95

Ser Ser Ile Leu Leu Tyr Pro Met Ser Asp Pro Asp Gln Leu Gly Ile
100 105 110

Asn Arg Gln Gln Leu Lys Leu Asn Leu Tyr Ser Tyr Phe Asn Asp Leu
115 120 125

Arg His Asp Phe Lys Leu Lys Val Leu Asp Ala Arg Ile Ser Lys Asn
130 135 140

Lys Gln Asn Ile Asp Thr Ile Ser Lys Tyr Leu Leu Glu Leu Gly Thr
145 150 155 160

Tyr Leu Asp Gly Ser Tyr Arg Met Met Glu Gln Asn Thr His Asn Ile
165 170 175

Asn Lys Asn Thr His Asn Ile Asn Lys Asn Thr His Asn Ile Asn Lys
180 185 190

Leu Ser Lys Glu Leu Gln Thr Gly Leu Ala Asn Gln Ser Ala Leu Ser
195 200 205

Met Leu Val Gln Pro Asn Gly Val Gly Lys Thr Ser Val Ser Ala Ala
210 215 220

Val Gly Gly Tyr Arg Asp Lys Thr Ala Leu Ala Ile Gly Val Gly Ser
225 230 235 240

Arg Ile Thr Asp Arg Phe Thr Ala Lys Ala Gly Val Ala Phe Asn Thr
245 250 255

Tyr Asn Gly Gly Met Ser Tyr Gly Ala Ser Val Gly Tyr Glu Phe
260 265 270

<210> 15
<211> 1047
<212> DNA
<213> Haemophilus ducreyi

<400> 15
ttttataatt tacaatacat tttatatattt tatattatat aaataccgtc attgacattt 60
ttttaatgta aggtagaata agaaagtaaa ttctatatatt acaatcaaga ttgacaatta 120
tttacttaat gaggtgatta tgaaaattaa atgttttagtt gccgtagtgg gattagcttg 180

ttctactatt acaacaatgg ctacagcagcc gccaaagttt gctggagtat ttcttttgta 240
 tagctatgag tatgactatg gtaagggtaa atggacttgg tctaatgaag gcggtttoga 300
 tattaaagtg ccagggatta aaatgaagcc aaaagaatgg atttctaaac aggctactta 360
 tcttgaatta cagcattata tgccttatac tctgttctc gtgacatctg ctcttgacgt 420
 ttctcttagc tctatctcta tactgttata tccgatgtct gatcctgac aacttggaat 480
 aaatcggcag cagctgaaat tgaatttgta tagttatttt aacgatttaa gacacgattt 540
 taaattaaaa gttcttgatg cacgtatttc caaaaataaa caaaatattg atactataag 600
 taaatattta ctagaactgg gtacttattt agatggttct tatcgtatga tggaacaaaa 660
 tacacataat atcaataaaa atacacataa tatcaataaa aatacacata atatcaataa 720
 gttgtctaaa gaattgcaaa ctggtttagc caaccaatca gcattgtcta tgttagtga 780
 accaaatggt gtaggcaaaa cgagcgtttc tgctgcggta ggaggttata gagataaaac 840
 tgcattagcc attggtgtcg gctcacgcat tactgatcgc tttaccgcta aagcgggtgt 900
 agcgttcaat acctacaatg gcggcatgct ttatggtgct tctgttggtt atgaattcta 960
 atcattacgt ttaatcacta atcgttttgg ttataataaa aaggctaaat gtttctctc 1020
 acatttagcc ttttcttatt tatcttt 1047

<210> 16
 <211> 273
 <212> PRT
 <213> Haemophilus ducreyi

<400> 16

Met Lys Ile Lys Cys Leu Val Ala Val Val Gly Leu Ala Cys Ser Thr
 1 5 10 15

Ile Thr Thr Met Ala Gln Gln Pro Pro Lys Phe Ala Gly Val Ser Ser
 20 25 30

Leu Tyr Ser Tyr Glu Tyr Asp Tyr Gly Lys Gly Lys Trp Thr Trp Ser
 35 40 45

Asn Glu Gly Gly Phe Asp Ile Lys Val Pro Gly Ile Lys Met Lys Pro
 50 55 60

Lys Glu Trp Ile Ser Lys Gln Ala Thr Tyr Leu Glu Leu Gln His Tyr
 65 70 75 80

Met Pro Tyr Thr Pro Val Leu Val Thr Ser Ala Pro Asp Val Ser Pro
 85 90 95

Ser Ser Ile Ser Ile Leu Leu Tyr Pro Met Ser Asp Pro Asp Gln Leu
 100 105 110

Gly Ile Asn Arg Gln Gln Leu Lys Leu Asn Leu Tyr Ser Tyr Phe Asn
 115 120 125

Asp Leu Arg His Asp Phe Lys Leu Lys Val Leu Asp Ala Arg Ile Ser
 130 135 140

Lys Asn Lys Gln Asn Ile Asp Thr Ile Ser Lys Tyr Leu Leu Glu Leu
 145 150 155 160

Gly Thr Tyr Leu Asp Gly Ser Tyr Arg Met Met Glu Gln Asn Thr His
 165 170 175

Asn Ile Asn Lys Asn Thr His Asn Ile Asn Lys Asn Thr His Asn Ile
 180 185 190

Asn Lys Leu Ser Lys Glu Leu Gln Thr Gly Leu Ala Asn Gln Ser Ala
 195 200 205

Leu Ser Met Leu Val Gln Pro Asn Gly Val Gly Lys Thr Ser Val Ser
 210 215 220

Ala Ala Val Gly Gly Tyr Arg Asp Lys Thr Ala Leu Ala Ile Gly Val
 225 230 235 240

Gly Ser Arg Ile Thr Asp Arg Phe Thr Ala Lys Ala Gly Val Ala Phe
 245 250 255

Asn Thr Tyr Asn Gly Gly Met Ser Tyr Gly Ala Ser Val Gly Tyr Glu
 260 265 270

Phe

<210> 17
 <211> 1189
 <212> DNA
 <213> Haemophilus ducreyi

<400> 17
 attttataat ttacaataca tttttatttt tatattatat aaatacgtca ttgacatttt 60
 tttaatgtaa ggtagaataa gaaagtaa tctatattta caatcaagat tgacaattat 120
 ttacttaatg aggtgattat gaaaattaaa tgtttagttg ccgtagtggt attagcttgt 180

tctactatta caacaatggc tcagcagccg ccaaagtttg ctggagtatc ttctttgtat 240
agctatgagt atgactatgg taagggtaaa tggacttggc ctaatgaagg cggtttcgat 300
attaaagtgc cagggattaa aatgaagcca aaagaatgga tttctaaaca ggctacttat 360
cttgaattac agcattatat gccttatact cctgttctcg tgacatatgc tcttggcggt 420
tctoctagcc ctatactggt atatccgatg tctgatcctg atcaacttgg aataaatcgg 480
cagcagctga aattgaattt gtatagttat tttaacgatt taagacacga ttttaaatta 540
aaagtctctg atgcacgtat ttccaaaaat aaacaaaata ttgatactat aagtaaatat 600
ttactagaac tgggtactta tttagatgat tcttatcgta tgatggaaca aaatacacat 660
aatatcaata agttgtctaa agaattgcaa actgggttag ccaaccaatc agcattgtct 720
atgttagtgc aaccaaattg tgtaggcaaa acgagcggtt ctgctgcggt aggagggtat 780
agagataaaa ctgcattagc cattgggtgc ggctcacgca ttactgatcg ctttaccgct 840
aaagcgggtg tagcgttcaa tacctacaat ggcggcgatg cttatgggtgc ttctgttggt 900
tatgaattct aatcattacg tttaatcact aatcgttttg gttataataa aaaggctaaa 960
tgtttctcct cacatttagc ctttcttatt tatctttggt atagcttttg ctgttataaa 1020
accgtttttt agccactttt attaattaag cttttaagcc tattcaatca gttctacttt 1080
cacttttttc accatattat ccgccacttc taaaacggta atattaagtt ggtttagcct 1140
aaattgggta ccttctatcg gaattttttc taaatgttct aaaattaag 1189

<210> 18
<211> 257
<212> PRT
<213> Haemophilus ducreyi

<400> 18

Met Lys Ile Lys Cys Leu Val Ala Val Val Gly Leu Ala Cys Ser Thr
1 5 10 15

Ile Thr Thr Met Ala Gln Gln Pro Pro Lys Phe Ala Gly Val Ser Ser
20 25 30

Leu Tyr Ser Tyr Glu Tyr Asp Tyr Gly Lys Gly Lys Trp Thr Trp Ser
35 40 45

Asn Glu Gly Gly Phe Asp Ile Lys Val Pro Gly Ile Lys Met Lys Pro
50 55 60

Lys Glu Trp Ile Ser Lys Gln Ala Thr Tyr Leu Glu Leu Gln His Tyr
65 70 75 80

Met Pro Tyr Thr Pro Val Leu Val Thr Tyr Ala Pro Gly Val Ser Pro
85 90 95

Ser Pro Ile Leu Leu Tyr Pro Met Ser Asp Pro Asp Gln Leu Gly Ile
100 105 110

Asn Arg Gln Gln Leu Lys Leu Asn Leu Tyr Ser Tyr Phe Asn Asp Leu
115 120 125

Arg His Asp Phe Lys Leu Lys Val Leu Asp Ala Arg Ile Ser Lys Asn
130 135 140

Lys Gln Asn Ile Asp Thr Ile Ser Lys Tyr Leu Leu Glu Leu Gly Thr
145 150 155 160

Tyr Leu Asp Asp Ser Tyr Arg Met Met Glu Gln Asn Thr His Asn Ile
165 170 175

Asn Lys Leu Ser Lys Glu Leu Gln Thr Gly Leu Ala Asn Gln Ser Ala
180 185 190

Leu Ser Met Leu Val Gln Pro Asn Gly Val Gly Lys Thr Ser Val Ser
195 200 205

Ala Ala Val Gly Gly Tyr Arg Asp Lys Thr Ala Leu Ala Ile Gly Val
210 215 220

Gly Ser Arg Ile Thr Asp Arg Phe Thr Ala Lys Ala Gly Val Ala Phe
225 230 235 240

Asn Thr Tyr Asn Gly Gly Met Ser Tyr Gly Ala Ser Val Gly Tyr Glu
245 250 255

Phe